

Appl. No. 10/800,747
Amdmt. Dated July 10, 2007

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REMARKS/ARGUMENTS

Status of Claims

Claims 3 to 23, 25 to 27 and 33 to 38 remain in the application, claims 1 and 2 are cancelled and claims 24 and 28 to 32 remain withdrawn.

Claim Amendments

Claims 3, 9 and 23 have been amended to recite at least one combining element that collectively combine all of the respective one or more wavelengths dropped subsequent to each amplification media segment to produce an amplified wavelength division multiplexed optical signal.

Claim 23 has also been amended to correct a minor grammatical error by replacing the term "passing" with "pass".

Withdrawn claim 24 has been amended to recite "wherein the at least one combining element comprises a multi-port optical multiplexer connected to combine the dropped wavelengths".

Claim 25 has been amended to recite that the at least one combining element comprises the plurality of four port optical add-drop multiplexers respectively located between the plurality of amplification media segments.

Withdrawn claim 28 has been amended to recite "at least one combining element comprising a N:1 optical multiplexer".

Claim Objections

In paragraph 3 of the Office Action, the Examiner objects to claim 3 on the grounds that "in the first paragraph 'optical amplification media segments' are recited, but in the third paragraph these are called '*fiber* amplification media segments', so it is unclear whether the segments are fibers or any type of optical amplification media." In response, it is noted that the second stanza of claim 3 recites "wherein each amplification media segment comprises a fiber

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amplification media segment". Accordingly, one skilled in the art would understand that the optical amplification media segments each comprise a respective fiber amplification media segment.

In view of the foregoing, it is respectfully submitted that claim 3 is readily understandable by one skilled in the art, and the Examiner is respectfully requested to reconsider and withdraw the objection to claim 3.

35 U.S.C § 102 Claim Rejections

In paragraph 5 of the Office Action, the Examiner rejects claims 3-11, 16 and 23 under 35 U.S.C. § 102(c) as being anticipated by U.S. Patent No. 6,738,181 to Nakamoto et al. (hereinafter referred to as "Nakamoto et al.").

Before setting forth a discussion of the prior art applied in the detailed action, it is respectfully submitted that controlling case law has frequently addressed rejections under 35 U.S.C. § 102. "For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference." *Diversitech Corp. v. Century Step, Inc.*, 850 F. 2d 675, 677, 7 U.S.P.Q. 2d 1315, 1317 (Federal Circuit 1988). "If any claim, element, or step is absent from the reference that is being relied upon, there is no anticipation." *Closter Speedsteel AB v. Crucible, Inc.*, 793 F. 2d 1565, 230 U.S.P.Q. 81 (Federal Circuit 1986). The following analysis of the present rejections is respectfully offered with guidance from the foregoing controlling case law decisions.

Claims 3, 9 and 23 have been amended to recite *inter alia*:

"at least one combining element that collectively combine all of the respective one or more wavelengths dropped subsequent to each amplification media segment to produce an amplified wavelength division multiplexed optical signal;"

It is noted that independent claims 3, 9 and 23 as amended remain generic claims to both of the embodiments of Figures 4 and 5. Figures 3, 9 and 23 recite that there are a plurality of amplification media segments concatenated in series and that one or more wavelengths are

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dropped after each segment so as to exploit a gain versus optical amplification media physical length characteristic, and that the one or more wavelengths dropped subsequent to each amplification media segment are collectively combined by at least one combining element to produce an amplified wavelength division multiplexed optical signal. This is true of the embodiments illustrated in both Figures 4 and 5. In Figure 4, the at least one combining element is implemented as a multiplexer 73 that combines each of the respective one or more wavelengths dropped from the plurality of add-drop multiplexers. In Figure 5, the at least one combining element is implemented as a plurality of four port optical add-drop multiplexers, so that both the wavelength dropping and wavelength combining are performed by the plurality of four port optical add-drop multiplexers.

With respect to the Examiner's rejection of independent claims 3, 9 and 23 as being anticipated by Nakamoto et al., it is submitted that the cited reference fails to teach the key limitation of currently amended independent claims 3, 9 and 23 identified above, and therefore cannot be found to anticipate the claimed invention.

The rejection of claims 3-11, 16 and 23 under 35 U.S.C. § 102 is based entirely on the system shown in Figure 3 of Nakamoto et al. Figure 3 of Nakamoto et al. illustrates an optical link between an optical sending apparatus 101 and an optical receiving apparatus 105 that includes a plurality of optical transmission lines 102-1 to 102-n, a plurality of optical amplifying apparatus 103-1 to 103-n and a plurality of optical add-drop multiplexers 104-1 to 104-n. The plurality of optical add-drop multiplexers 104-1 to 104-n are used to add or drop wavelengths at points along the optical link between the optical sending apparatus 101 and the optical receiving apparatus 105. The plurality of optical amplifying apparatus 103-1 to 103-n provide optical amplification to the wavelength division multiplexed optical signal transmitted between the optical sending apparatus 101 and the optical receiving apparatus 105 to try to account for attenuation of the signal along the length of the optical link. There is no suggestion in Nakamoto et al. that channels dropped at respective optical add-drop multiplexers are combined, as recited in currently amended claims 3, 9 and 23. Thus, Nakamoto et al. fails to teach an apparatus with all of the features of the claimed invention.

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The present invention is directed to an apparatus that provides optical amplification in a manner such that channel wavelengths of a WDM signal are each amplified by a desired amount. For example, each channel wavelength may be amplified such that the amplification across the wavelength range is substantially flat. Accordingly, independent claims 3, 9 and 23 recite an apparatus that includes:

“a plurality of optical amplification media segments which are concatenated in series; wherein subsequent to each optical amplification media segment a respective one or more wavelengths in a respective wavelength range is dropped so as to exploit a gain versus optical amplification media physical length characteristic;

at least one combining element that collectively combine all of the respective one or more wavelengths dropped subsequent to each amplification media segment to produce an amplified wavelength division multiplexed optical signal”.

The combining of the respectively dropped one or more wavelengths produces an optical signal that includes each of the wavelengths amplified by the desired amount determined by the total length of amplification media that the respective wavelengths travelled through. Passing respective wavelengths through different lengths of amplification media and combining the resulting amplified wavelengths allows for the wavelength dependent amplification of many amplification media materials to be effectively compensated for. Therefore, embodiments of the present invention may provide an optical amplifier with a substantially flat gain across a range of wavelengths. No such functionality is provided by the system shown in Figure 3 of Nakamoto et al., since Nakamoto et al. fails to teach or even suggest combining the channel wavelengths dropped at the respective optical add-drop multiplexers 104-1 to 104-n.

In view of the foregoing, it is respectfully submitted that Nakamoto et al. fails to teach at least one limitation of independent claims 3, 9 and 23, and therefore these claims cannot be found to be anticipated by Nakamoto et al. given the rulings in *Diversitech Corp. v. Century Step, Inc.* and *Closter Speedsteel AB v. Crucible, Inc.*

By virtue of their claim dependencies on one of the independent claims, it is submitted that dependent claims 4-8, 10-22, 25-27 and 34-38 are novel and inventive over Nakamoto et al.

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for at least the same reasons.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 3-11, 16 and 23 under 35 U.S.C. § 102 based on Nakamoto et al.

35 U.S.C § 103 Claim Rejections

In paragraph 7 of the Office Action, the Examiner rejects claims 12-14 under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto et al. in view of U.S. Patent No. 6,356,383 to Cornwell, Jr. et al. (hereinafter referred to as "Cornwell, Jr. et al."), rejects claim 17-20 under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto et al. in view of U.S. Patent No. 6,417,960 to Shimojoh (hereinafter referred to as "Shimojoh"), and rejects claim 21-22 under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto et al. in view of U.S. Patent No. 5,675,432 to Kosaka (hereinafter referred to as "Kosaka").

The requirements for establishing a *prima facie* case of obviousness as set out in the MPEP Section 2143.01 require that the references when combined teach all of the claimed limitations, that there be a reasonable expectation of success in realizing the claimed invention, and that there be a motivation/reason to combine the references.

It is respectfully submitted that Cornwell, Jr. et al., Shimojoh and Kosaka fail to teach or suggest the key limitation of independent claims 3, 9 and 23 that Nakamoto et al. fails to teach.

It is noted that rejected claims 12-14 and 17-22 depend directly or indirectly on one of the independent claims 3 or 9.

Accordingly, it is submitted that the first requirement for establishing a *prima facie* case of obviousness cannot be satisfied. That is, the cited references fail to teach all of the claimed limitations.

In view of the foregoing, the Examiner is requested to reconsider and withdraw the rejection of claims 12-14 and 17-22 under 35 U.S.C. § 103, since a *prima facie* case of obviousness cannot be established.

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Withdrawn Claims

As noted above, independent claims 3, 9 and 23, as amended, remain generic claims that encompass the particular embodiments shown in both Figures 4 and 5. Accordingly, withdrawn claim 24, as amended should be allowed in the event that independent claim 23 upon which it depends is allowed, since independent claim 23 is a generic claim.


It is also noted that the Examiner has indicated that claims 33-38 contain allowable subject matter. Claims 33-38 encompass the particular embodiment shown in Figure 5 of the instant application. Withdrawn claims 28-32 encompass the particular embodiment shown in Figure 4 of the instant application. It is respectfully submitted that in the event that generic independent claims 3, 9 and 23 are allowed, both claims 28-32 (covering the embodiment shown in Figure 4) and claims 33-38 (covering the embodiment shown in Figure 5) should be allowable in the same application.

In view of the foregoing, early favorable consideration of this application is earnestly solicited. In the event that the Examiner has concerns regarding the present response, the Examiner is encouraged to contact the undersigned at the telephone listed below.

Respectfully submitted,

LIFE QIAO, ET AL

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RAB:JFS:sng